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ABSTRACT

It is argued that learning from different sources greatly depends on the differential way in which these sources are perceived, for these perceptions determine to an important extent the mental effort expended in the learning process. Two ideas are discussed: (1) amount of mental effort investment (AIME), defined as the number of nonautomatic elaborations applied to a unit of material, and measured by self reports, is seen as capturing the essence of such constructs as depth of processing and mindful processing; and (2) the role played by perceptions, beliefs and preconceptions which pertain to the nature of a particular class of materials and the effort it demands. Evidence is provided from studies that examined the ways in which TV is perceived, in comparison to print, and how these perceptions affect the actual ways of handling specific materials from each medium. The case is then generalized to other kinds of sources. (Author)

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THE DIFFERENTIAL INVESTMENT OF MENTAL EFFORT IN LEARNING FROM DIFFERENT SOURCES

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ABSTRACT

It is argued that learning from different sources greatly depends on the differential way in which these sources are perceived, for these perceptions determine to an important extent the mental effort expended in the learning process. Two ideas are discussed in some detail: (a) amount of mental effort investment (AIME), defined as the number of nonautomatic elaborations applied to a unit of material, and measured by self reports; it is seen as capturing the essence of such constructs as depth of processing and mindful processing, and (b) the role played by perceptions, beliefs and preconceptions which pertain to the nature of a particular class of materials and the effort it demands. Evidence is provided from studies that examined the ways in which TV is perceived, in comparison to print, and how these perceptions affect the actual ways of handling specific materials from each medium. The case is then generalized to other kinds of sources.

THE DIFFERENTIAL INVESTMENT OF MENTAL EFFORT IN LEARNING FROM DIFFERENT SOURCES

The movie Being There presents a funny, yet curious case: A not particularly bright person is regarded as extremely smart, and hence great depth is found in everything he utters regardless of how shallow his utterances are. As more wisdom is discovered in these banalities, the more is he regarded as a source of great wisdom. While written as an entertainment film, it suggest a few rather interesting points for research on teaching and learning, provided we are willing to treat the movie as a potential source of some relevant insights. For if the movie is regarded as no more than trivial entertainment then little will be learned from it, even if there is something to be learned. This in fact is the major point of this paper: We can learn something from a source of information, given that it carries some potentially useful information, if we'd perceive it to warrant the investment of effort needed for the learning to take place.

The argument of this paper is that learning, in its generic sense, greatly depends on the differential way in which sources of information are perceived, for these perceptions influence the mental effort expended in the learning process. This argument is comprised of two ideas. First, The amount of mental effort learners invests in extracting information from a source, discriminating among its information units, remembering the information, or elaborating it in their minds, is influenced by the way they perceive that source. Perceptions of a source pertain to the mental requirements of its messages, their attributes (e.g. depth, complexity, importance), the tasks to be performed with them, and contexts in which one is exposed to that source. Second, it is argued that learning is strongly

influenced by the amount of mental effort learners invest in processing the material, that is -- the "depth", or "thoughtfulness" with which they process it. It follows from these two ideas that learning, particularly when it entails more effortful processing, is affected by the way one peceives the source of the information-to-be-learned.

While these two ideas may appear as self evident, it seems that they are not, once one considers how much they disagree with some popular assumptions. For example, it is often assumed that what determines effort investment is the difficulty of the stimulus or task -- that is, its novelty or complexity; the processing load left to the learner (Snow, 1977); or the amount of "cognitive capacity" which it uses as a function of its content density or structural complexity (Britton, Glynn, Meyer, & Penland, 1982). Such assumptions are not necessarily wrong; but as the research on attributional and inferential errors shows, they are not always right either. Thus, is the amount adults or children learn from, say, television, just a function of what the medium offers or demands of them, in interaction with their abilities? Or do their justified and unjustified perceptions of the medium's qualities -- its typical attributes and the tasks one usually performs with it -- influence their learning as well? It can be argued that the latter factor, perceptions, plays a far more important role than is usually assumed.

Before I discuss further the main idea that perceptions of source affect the effort invested in processing its material I need to clarify the construct of effort investment and its relations to learning.

THE AMOUNT OF INVESTED MENTAL EFFORT

The idea that the investment of effort in processing improves learning is of course not new. Many researchers have employed the idea of effort as

a hypothetical construct to explain learning and performance differences. For example, Bandura (1982) related the constuct of sustained effort to differences of perceived self efficacy and to performance. The more one believes in one's ability to perform a task, the more is s/he likely to invest sustained effort in performing it. Butkowsky & Willows (1980) used a similar construct to explain the reading failures of learners who display learned helplessness. The more they fail the more helpless they feel and the less effort they come to invest in reading. But despite its intuitive soundness, the construct of effort, as a motivated, partly voluntary investment of mental energy, is not very clear (Baddley, 1978). The convergence of two lines of research may however be useful in clarifying it.

One line stems from research on memory and cognition. Craik & Lockhart (1972) distinguished between maintainance rehearsal -- repeating material without much thinking about it -- and elaborative rehearsal -- relating it to stored knowledge, analysing it, associating it, and the like. The latter kind of rehearsal, they claimed, addresses the material at "deeper levels" and facilitates long term memory of the material. Brown (1975) similarly distinguished between involuntary recall of material, automatically carried out, and deliberate memory, the result of deeper processing which leads to better recall of the material. Other research (e.g. Craik and Tulving, 1975; Kane and Anderson, 1978; Mayer, 1980; Britton, et al., 1982) has generally supported the hypothesis relating deeper processing to improved long term memory of text material, recall of conceptual information, and transfer to new materi

Processing can entail more or fewer elaborations, depending on the ease with which a unit of material fits preexisting schemata. As Bobrow and

Collins, (1975) point out:

> Data which either were deemed to be important or which could not easily be accounted for would ... receive sufficient processing effort and, as a result, they would probably be remembered later. Moreover, we suspect that they would receive conscious attention at the time of their arrival and processing. Thus data which are expected or otherwise readily accounted for would be ill remembered (p. 145).

Deeper processing entails mental elaborations of material. Kintsch (1977) postulated that the more one mentally elaborates the material, the more contact it makes with other mental schemata, thus leaving more memory traces and enriching the meanings arrived at. Recall, comprehension, skill mastery, and even transfer to new material, improve when more elaboration is involved (e.g. Mayer, 1980).

There are at least two kinds of elaboration to be considered. Elaboration can be automatic, carried out by well mastered mental processes over which a person exercises little conscious control, and which are carried out with great ease in large chunks. Such elaborations would usually be the result of much repeated practice and training. Elaboration can, however, be controlled and nonautomatic, requiring attention and effort (Shiffrin and Schneider, 1977). Such elaborations would generally be applied to relatively new, complex, or otherwise less practiced material. Given a specific level of relevant skill mastery, it is the employment of controlled, effortful elaborations that improves learning in the sense of better recall, more generated inferences, and better integration of the material in memory.

The second line of research, developed in social psychology by Ellen Langer, has offered the construct of "mindlessness" to represent the

ostensibly unattentive behavior of otherwise intelligent people. Under some conditions, to be mentioned later on, people are observed to fail to employ their processing abilities, thus displaying "behavior mindless of relevant detail". Mindlessness has been defined by Langer (in press, p.1) as "the absence of active conscious information processing, where the individual relies on the structure of the situation representative of its underlying meaning". Mindfulness, in contrast

> is a cognitively active state characterized by conscious manipulation of the elements of one's environment, in which case the individual questions old categories or constucts new ones. It should be noted that although attention is a nesessary condition for mindfulness, it is not sufficient. That is, mindfulness involves the active manipulation of the elements that one attends to (Langer & Imber, 1980, p. 360).

It appears that mindlessness (vs. mindfulness) and shallow processing (vs. deep) are closely related to each other. For Langer, mindlessness in processing means ignoring information which is perceived to be already known, and can be easily assimilated (rightly or wrongly) into preexisting schemata. Well rehearsed scripts can then be used. Mindful behavior means taking full account of such information. Shallow processing, as dealt with by Craig, Kintsch and others, means automatic processing of well rehearsed features, while deep processing means the effortful employment of non-automatic elaborations. It is easy to notice the similarity of the two sets of constructs. In both cases deeper or more mindful processing are assumed to entail mental elaborations of the material, and in both cases the absence of such indicates automatic, effortless behavior. When relatively new, unexpected, or complex material is perceived to be highly

familiar and is met with shallow, automatic, or mindless processing, then poor performance is predicted and observed (e.g. Langer and Imber, 1979). We find this to be the case in our studies in which recall and inference-generation are measured (Salomon, in press).

The common feature underlying both pairs of constructs is the effortful, nonautomatic elaboration of the encountered material. Mental effort, relevant to the task and material, appears to be the feature that distinguishes between mindless or shallow processing on the one hand, and mindful or deep processing, on the other. Little effort is expended when processing is carried out automatically or mindlessly. Elsewhere I have labeled that feature as the amount of invested mental effort, or AIME, and defined it as the number of nonautomatic elaborations applied to a unit of material (Salomon, 1981a,b).

AIME so defined reflects both cognitive and motivational attributes. It is cognitive in the sense that it pertains to mental elaborations of information material. But as these elaborations are controlled, rather than automatic, their employment implies a measure of choice, as all controlled activites do (e.g. Steiner, 1976). The exercise of choice, the preference of one alternative course of action over another, implies in turn the existence of motivation (e.g. Brigham, 1976). Nonautomatic effort demanding elaborations are at one's disposal; their actual employment is a matter of choice and motivation.

However, mental effort investment and motivation are not to be equated. Motivation is the driving force, but for learning to actually take place some specific relevant mental activity needs to be activated. This activity is assumed to be the employment of nonautomatic effortful elaborations. Being motivated to recall material better one would need to generate

mnemonics, to conjure up images, and the like, and being motivated to comprehend the material better one would need to elaborate it in one's mind. Motivation is probably the driving force for the expenditure of effort in such mental activities, but it is the effort-demanding activities that produce better recall, comprehension, or inference-making.

The problem one faces here is how to measure mental effort investment. Kerr (1973) has suggested the secondary task technique to measure the amount of cognitive capacity usage, that is -- mental effort, required by a primary task. Subjects are given a primary task such as reading and asked to perform at the same time another task, such as rapid responding to clicks. The assumption is that the extent to which performance on the secondary task is reduced (e.g. slower responses to the clicks) relative to a control condition, to that extent does the primary task reqire more mental effort. This technique demands however that "the Ss direct their attention toward the primary task rather than switch or alternate attention between the two tasks" (Kerr, 1973, p. 405). This renders the technique inappropriate for cases where subjects are to perform the primary task as they would choose under normal conditions. Telling subjects to perform the primary task as best as they can by "establishing payoffs that guarantee higher awards for the primary task" (p. 40.) decreases the chance that they will perform any task mindlessly or with little effort investment. Thus, although the construct of cognitive capacity usage resembles the construct of AIME, and although it was validly measured in a number of experiments (e.g. Britton, Piha, Davis, & Wehausen, 1978; Britton, Glynn, Meyer, & Peland, 1982), it can not be employed to measure voluntary AIME.

Trying out various methods, my students (Weissberger, Leigh, Halpern,

Ben-Moshe, & Tzeder) and I have finally settled on the use of self reports. Subjects are asked how much effort they invest in a particular unit of material. Self reports of effort investment can pertain to general classes of material (e.g. story books, TV programs), or to specific ones; they can pertain to typical effort investment or to the effort invested in processing a unit of material just exposed to; they can be reports of the effort invested by the student him- or herself, or by his- or her friends; they can be direct questions (e.g. how much effort have you put in comprehending this story?) or less direct ones (e.g. how much did you concentrate while you were reading this story?). We find that children on the average are quite capable of assessing the effort they expend in a particular task. Reported AIME correlates up to .67 with the number of generated inferences (Salomon, note 1). Children who are asked to read a difficult text report the expenditure of more effort than those who read an easy text (Leigh, reported in Roberts and Salomon, note 2). Children asked to read for fun report investing less effort and gernerate fewer inferences than children who are asked to read for an exam (Halpern, in Roberts & Salomon, note 2). And students who are told a TV show is designed for a public network report expending more AIME in processing it than those told it is designed for a commercial network (Kunkle, note 3).

In sum, we seem to have a definition of effort, encompassing the gist of what is essentially meant by deep or mindful processing or by "cognitive capacity usage": Mental effort invested in processing means the employment of nonautomatic elaborations performed on the material. We also appear to have a relatively satisfactory, though still robust, way of measuring the amount of invested mental effort under natural conditions of exposure to material, independently of the measurement of performance or learning from

hich effort is usually inferred.

THE ROLE OF PERCEPTIONS

It would appear that, other things being equal, amount of mental effort hould be a combined function of one's mastery of the relevant mental kills, and the nature of the stimulus to be processed for a particular ask. One would expect that, given a particular stimulus, task, and a esired level of performance, children with a better mastery of relevant kills will invest less effort in processing a unit of material than hildren who have a poorer mastery of the requisite skills. Better skill astery implies more automaticity of skill employment, and hence, by efinition, a smaller amount of mental effort is needed to reach the same reset level of message comprehension by the more skillful child. imilarly, more demanding, difficult, or novel stimuli, are generally xpected to evoke more effort investment than simple stimuli. When children re claimed to watch TV impressionistically and nonanalytically (e.g. inger, 1980), the reason is attributed to the medium's shallowness, icto iality, "crowdedness", and rapid pace. On the other hand, the more erious, deeper treatment of print is claimed to reflect the more demanding ature of that medium, a function of its memory-taxing linearity, its elative abstractness, and imagery-generation requirements.

But the nature of stimuli, their complexity, novelty, structuredness, ace, and the like, in interaction with learners' abilities, affect erformance or learning outcomes only to some extent. Perceptions, in the ense of predispositions, preconceptions, attitudes, or attributions, also lay an important role in the way one treats information. This is well ocumented in the literature on causal attributions, persuasion,

attributional errors, inferential errors, and the like (e.g. Nisbett & Ross, 1980). Furthermore, perceptions do not always, nor necessarily, reflect the true nature of the given material. As Tverski & Kahneman (1974) show:

> People make estimates about events and other people by starting from an initial value that is adjusted to yield a final answer. The initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of a partial computation. In either case, adjustments are typically insufficient. That is, different starting points yield different estimates, which are biased toward the initial values (p. 1128).

Langer and Benevento (1978) have shown that when people perceive a message as highly familiar in structure they forgo any detailed processing of its content and respond to it mindlessly. Such mindlessness takes place when on the basis of a few structural features, a stimulus is perceived to fit well into an already well mastered schema and a well mastered, overlearned set of responses is stereotypically enacted (Langer and Imber, 1979). The particulars of the stimulus are overlooked, even when the stimulus warrants a more careful treatment, and thus very often the original hypothesis concerning the familiarity or simplicity of the stimulus becomes self sustained.

The importance of such behavior is in its frequent application to stimuli which are not as simple as perceived (or as in Being There -- are not complex or deep as perceived), leading to poorer performance or to less learning than both one's ability and the nature of the encountered stimulus warrant. We face here a case of "biased coding" (Nisbett and Ross, 1980), where people who are equipped with a strong theory or expectation concerning the nature of the stimulus ("this text was written by a guy who

keeps repeating the same ideas") may fail to examine its particulars or to elaborate it in their minds. They lean more heavily, so to speak, on top-down processes, predetermined by prior knowledge, at the expense of bottom-up processes. Strong preconceptions or perceptions of some material, source or medium that include beliefs or expectations about the AIME required ("this journal publishes only the most important and carefully screened stuff"), may affect the actual investment of mental effort, hence of learning.

Not all perceptions operate alike. The ones that influence the investment of mental effort in a unit of material are those perceptions which are so well established, so widely held, and so often successfully applied that the operative scripts that follow from them do not easily accommodate to the specific demands of a particular stimulus. They become refractory to disproof (Weick, 1979).

It may be true that, as Mischel (1979, p.748) has pointed out, "Perceivers certainly go beyond the information they are given, but it seems unlikely that they generally invent the information itself". But all this means is that peoples' perceptions of a source or task come from somewhere, thus are not pure fabrications of their own minds. However, going beyond the immediately given information may entail expectations pertaining to the AIME needed for a class of materials, which, although not totally imaginary, may still create unwarranted self sustaining (not fulfilling!) prophecies when applied to specific cases (Salomon, 1981c). In a recent study (Salomon, in press) we have measured among other things also the way television and print are perceived, how deep or shallow they are in the subjects' eyes, and how easy or difficult they usually are to comprehend.

We found systematic and positive relations (r=.32 to .36) between the way a source of information is initially perceived (how deep and demanding it is) and the amount of effort students report investing in a particular subsequent presentation of material from that source.

It is only when the deviation of the presented material from the prototype that students seem to have stored in their minds is extremely large, as when a scrambled TV story is shown, or a text turns out to be unexpectedly difficult, that early perceptions are less strongly related to the effort reported to be invested in the processing of that particular unit of material. In the latter case, ability, rather than initial perceptions, or perceived worthwhileness of effort expenditure, become the better predictors of learning outcomes (Leigh, in Roberts & Salomon, note 2).

DIFFERENTIAL PERCEPTIONS AND THE INVESTMENT OF MENTAL EFFORT

At least two classes of perception can be considered to affect AIME. One class is the differential perception of stimulus categories or sources to which particular units of material are assigned. Television is one such example, and print another. Children perceive TV to be more life-like than print (Salomon, note 1), come to make reality-fantasy distinctions earlier with print than with TV (Landry & Gardner, note 4), and most of them, even sixth graders, fail to invoke in their responses to a program its purpose or intention (Morison, Kelly, & Gardner, in press). The material presented on TV is perceived to be shallower and less variable than the material presented in print, even when the content areas (e.g. adventure stories, sports, science) are held constant. When children are asked about their reasons for success or failure in comprehending televised or text material many of them attribute failure with television to "dumbness" but with print to to its difficulty; success in comprehending TV is attributed to its

"ease", and in print --to readers' "smartness" (Salomon, note 1). Most importantly, children report perceiving TV to demand the expenditure of far less mental effort than print, even when the same content categories are involved (Salomon, in press).

Bachen, Hornby, Roberts, & Hernandez-Ramos (note 5) carried out a large scale survey concerning reading and televiewing habits of third and sixth graders. They included questions pertaining to the children's orientations toward print and TV. Standard reading ability test scores were included in the data set as well. Using such questionnaire and test scores, and submitting the data to path analyses they have found that the better predictor of reading ability, particularly of third graders, was not the amount of television watched but rather the orientation that children have to the medium. The more serious the orientation toward TV, the poorer the reading scores. The combined measure of orientation included such components as the effort that the medium is perceived to demand, the function it is perceived to accomplish, and the like.

We have termed such perceptions of sources -- Perceived Demand Characteristics, or PDC. We expected, and found, that the effort invested in processing a particular unit of material from a source such as TV or print is related to its respective initial PDC: More effort is reported to be invested in a source when it is perceived to be "serious" and demanding. We have found in one of our studies (Halpern, in Roberts & Salomon, note 2) that when PDC is experimentaliy manipulated, as when children are told to watch (or read) the material knowing that they will be tested on it, their PDC appears to change as inferred from their increased effort investment, the number of subsequently generated inferences, and from their own direct

reports. Kwaitek and Watkins (note 6) have manipulated instructions in a similar fashion and found similar improvements in the kind of post-exposure responses. They did not measure children's reported AIME, but it is reasonable to assume that, as in our study, both PDC and effort investment were affected by the manipulation.

A second class of perceptions pertains to learners' self efficacy in processing material of a particular source. It has already been shown that poor self efficacy leads to little investment of sustained effort (Bandura, 1977; 1982). Perceived self efficacy refers to subjective judgments of how well one can execute a course of action, handle a situation, learn a new skill or unit of knowledge, and the like. As Bandura (1982) points out:

> Judgments of self-efficacy...determine how much effort people will expend and how long they will persist in the face of obstacles or aversive experiences. When beset with difficulties people who entertain serious self doubts about their capabilities slacken their efforts or give up altogether, whereas those who have a strong sense of efficacy exert greater effort to master the challenge (p.123).

Other research, concerned with self concepts of learners, generally obtains findings in agreement with such a formulation (e.g. Shavelson, Cadwell, & Izu, 1977; Butkowsky & Willows, 1980; Convington & Omelich, 1981).

Bandura (1982) distinguishes between the role played by perceived self efficacy in learning and its role in the execution of already mastered knowledge and skill. In the case of learning, he argues, lower levels of perceived self efficacy intensify effort investment, while hindering performance. On the other hand, high levels of perceived self efficacy may hinder learning, as the learners feel no need to invest much preparatory

effort, but such high levels may facilitate performance as they help to withstand failure.

We have found (Salomon, note 1) that children's reported self efficacy in reading correlated positively with reported AIME (r=.37) and with learning achievement (r=.52) from a text, but perceived self efficacy in comprehending TV (which was significantly higher than with print) correlated negatively with both AIME (r=-.49) and with inferential learning achievement (r=-.34) from a comparable TV story. Following Bandura, it would be reasonable to argue that children try to learn from texts but not from TV.

Perceived self efficacy has much to do with how a class of stimuli is perceived. The more demanding it is perceived to be the less efficacious would the perceivers be about it, and the more familiar, easy, or shallow it is perceived, the more efficacious they would feel in handling it.

It follows from the above that perceived self efficacy should be related to the perception of demand characteristics (the latter includes the perceived worthwhileness of expending effort), and that both should affect effort investment jointly. This is what we have found in one of our studies, carried out by Leigh (reported in Roberts & Salomon, note 2). For example, more intelligent students do not regard TV as particularly demandingand and, as shown in another study by Weissberger -- they regard themselves to be highly efficacious with that medium. When shown a new and quite demanding TV program, they generate <u>fewer</u> inferences than from a comparable text. They even perform less well than their less intelligent peers!

The argument presented here does not imply that differential perceptions of material classes (e.g. stories on TV, science fiction books) are always

or necessarily wrong. Children are not that wrong when they perceive reading to be more demanding than TV, or math to call for more effort than, say, art. But perceptions become misleading when, first, they do not have provisions for the variety and variability of specific materials from the same source; that is -- when perceptions are too general and stereotypic. In one of our studies we have computed each student's variance of responses to nine Likert type questions concerning the effort invested in different kinds of TV programs or books. The size of variance, we reasoned, indicates how stereotypically one perceives a source of infomation: The smaller the variance the more stereotypic the perception. We found that the stereptypity with which TV programs are perceived by undergraduates correlates negatively (r=-.35) with reported AIME. The respective correlation in the case of books is -.32, but the mean score of stereotypity is far lower.

Second, when perceptions of a particular source or class are widely held, consensually anchored and reinforced by teachers and parents, then it would be reasonable to expect them to be less accommodating to specific variants. Consensually held views of particular sources may correctly reflect the amount of <u>minimal</u> effort which is absolutely necessary for the extraction of basic information from a source. But they may be less correct with respect to the level of <u>optimal</u> AIME which may be warranted under some conditions. TV may indeed demand less effort than print for basic decoding. However, this does not mean that the investment of more effort is never possible or worthwhile. Assuming the existence of a "pool" of effort that can be allocated to tasks (Kahneman, 1973), and assuming that little effort needs to be allocated to the task of basic decoding, then more effort could be invested in post-decoding elaborations of the televised material. But,

paradoxically, this shift of effort from decoding to elaboration is not done. It is as if the viewer decides that if no effort is needed for decoding then elaboration does not deserve any effort either.

It is possible that the relatively poor learning outcomes of inner city minority children observing Sesame Street (Cook et al, 1974) are partly due to the general view, adopted even by young viewrs, that TV is not worth the investment of much effort. Add to this the entertaining appearance of the program, which reinforces this view, and it becomes clear why relatively little is learned from it. Only when lower class mothers are asked to coobserve the program with their children that large gains in knowledge and skill aqcuisition are observed (Salomon, 1977; Cook, et al., 1974). It is reasonable, although it was never measured directly, that the coobserving mothers affect their children's perceived demand characteristics of the situation, thus increasing the chidren's effort expenditure.

Still another factor, related to the others, is what learners expect the expansion of greater AIME to yield. Expectancy theory tells us that two factors are involved here: the importance of a particular yield, and the price to be paid for it. If one learns that information from certain sources is not very important, why should more effort be invested in it? We have recently found that perceived worthwhileness of investing effort in learning from a particular unit of TV material correlated on the one hand .35 with reported AIME; on the other hand it correlated .30 with learning from that unit. This may suggest that skill training, as is now quite popular with respect to TV, is not enough, unless the perception of worthwhileness of applying the new skills is changed as well.

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The examples presented here are based on the comparison of two sources only, concerning which children have relatively clear perceptions. But one could generalize the case to other sources, subject matter areas, and learning situations as well. Kunkle (note 3) compared the AIME that students report to invest in public and commercial TV and found the expected difference in favor of the former. He then showed half of them a program which he claimed was desinged for PBS; he showed the same program to the other half claiming it was designed for a commercial network. The students in the the first group learned more and reported investing more effort in processing the program than the students in the second. It appears that even a change of lables (PBS or commercial network) can affect students' perceptions of how worthwhile the expension of effort is in processing presented material.

Working with proffesional adults, Langer & Abelson (1974) have found that psychotherapists, routinely used to labeling patients, described a person, presented to them on tape as "patient", significantly more mindlessly than when the person was presented as "job applicant". Thus, it is not just the case of TV vs. print; it could be any well rehearsed category vs. a less well rehearsed one.

The implication that follows from this discussion is clearly <u>not</u> that familiarity should not be encouraged, or that preconceptions should be avoided. Prior knowledge itself is not the cause for mindless processing. We need to distinguish between knowledge and skill, the building blocks of one's schemata, and metarules or metacognitions which prescribe when, under what conditions, and for what purpose one is to apply them (Abelson, 1981). The differential perceptions about information sources that affect AIME are akin to such metarules. To the extent that one's metarules or

metacognitions, not the knowledge subsumed under them, prescribe the shallow, mindless handling of an information class, to that extent will there actually be little investment of mental effort in processing.

Shoham-Salomon (note 7) has found that therapists whose thinking is guided by well developed medical models of schizophrenia are less attentive to the details of a presented case, imposing on it the models' interpretations, than are therapists who are guided by more psycho-social models. The difference, she argued, is not due to the contents of the two classes of models, for they would produce the same amount of bias, but rather to the nature of their respective metarules: those of the medical models prescribe less reliance on the raw data and more on the theory (top-down metarules), whereas the opposite is the case with the psycho-social models (bottom-up metarules).

Seen from an educational point of view, it would be desirable for learners to learn how to entertain more uncertainty as to the mental demands of different sources of information, examining each case for what it entails, rather than rely on consensually held preconceptions. This, then, leads us back to Flavell's recommendation that children's metacognitions should be trained to improve their "critical appraisal of message sources, quality of appeal, and...consequences needed to cope with these inputs (1979, p.910)".

Footnotes

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Refereca notes

1. Salomon, G. TV is 'easy" and print is "tough": the role of perceptions and attributions in the processing of material. Paper submitted to the Journal of Educational Psychology, 1981.

2. Roberts, D., & Salomon, G. Television and Reading: Second annual report to the Markle Foundation. Stanford University, June, 1982.

3. Kunkle, D. Assessing AIME: an empirical analysis of the relationship between mental effort and learning from TV. Unpublished paper, USC, 1981.

4. Landry, M.D., & Gardner, H. Reality-fantasy discriminations in literature: a developmental study. Harvard Project Zero, Technical report no. 21, 1981.

5. Bachen, C.M., Hornby, M.C., Roberts, D.F., & Hernandez-Ramos, P.F. Television viewing behavior and the development of reading skills: survey evidence. Paper read at the Annual Meeting of the American Educational Research Association, New York, March, 1982.

6. Kwaitek, K., & Watkins B. The systematic viewer: an inquiry into the grammar of television. Children's Media project, The University of Michigan. First annual report to the Spencer Foundation, July, 1981.

7. Shoham-Salomon, V. The ways in which differences between the medical model and psycho-social paradigms are reflected in therapists' perceptions of labeled schizophrenics. Unpublished Doctoral Dissertation, Tel Aviv University, 1981.

Refernces

Abelson,R.P. Psychological status of the script concept. American Psychologist, 1981, 36, 715-729.

Baddley, A.D. The trouble with levels: a reexamination of Craik and Lockhart's framework for memory research. Psychological Review, 1978, 85,

139-152.

Bandura,A. Self efficacy: toward a unifying theory of behavioral change. Psychological Review, 1977, 84, 191-215.

Bandura, A. Self efficacy mechanism in human agency. American Psychologist, 1982, 37, 122-147.

Bobrow, D.G. & Collins, A. Representation and understanding: studies in cognitive science. New York, Academic Press, 1975.

Brigham, T.A. Some effects of choice on academic performance. In L.C. Perlmuter & R.A. Monty (eds.), Choice and perceived control. Hillsdale, NJ.: Lawrence Erlbaum, 1979.

Britton, B.K., Glynn, S.M., Meyer, J.F., & Penland, M.J. Effects of text structure on use of cognitive capacity during reading. Journal of Educational Psychology, 1982, 74, 51-61.

Britton, B.K., Piha, A., Davis, J., & Wehausen, E. Reading and cognitive capacity usage: adjunct question effects. Memory & Cognition, 1978, 6, 226-273.

Brown, A.L. The development of memory: knowing, knowing about knowing, and knowing how to know. In H.W. Reese (ed.), Advances in child development and behavior, vol. 10. New York: Academic Press, 1975.

Butkowsky, I.S., & Willows, D.M. Cognitive motivational characteristics of children varying in reading ability: evidence for learned helplessness in poor readers. Journal of Educational Psychology, 1981, 72, 408-422.

Cook, T.D., et al., "Sesame Street" revisited. New York: Russell Sage, 1975.

Covington, M.V., & Omelich, C.L. As failure mounts: affective and cognitive consequences of ability demotion in the classroom. Journal of Educational Psychology. 1981, 73, 6, 796-808.

Craik, F.I.M., & Lockhart, R.S. Levels of processing: a framework for memory research. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 671-684.

Craik, F.I.M., & Tulving, E. Depth of processing and retention of words in episodic memory. Journal of Experimental Psychology: General, 1975, 104, 268-294.

Flavell, J.H. Metacognition and cognitive monitoring: a new area of cognitive-developmental inquiry. American Psychologist, 1979, 34, 906-911.

Kahneman, D. Attention and effort. Englewood Cliffs, NJ.: pretice Hall, 1973.

Kane, J.M., & Anderson, R.C. Depth of processing and interference effects in the learning and remembering of sentences. Journal of Educational Psychology, 1978, 70, 626-635.

Kerr, B. Processing demands during mental operations. Memory & Cognition, 1973, 1, 401-412.

Kintsch, W. Memory and cognition. New York: Wiley, 1977.

Langer, E.J. Playing the middle against both ends: The usefulness of adult cognitive activity as a model for cognitive activity in childhood and old age. In S.R. Yussen (ed.), The development of reflection. New York: Academic Press, (in press).

Langer, E.J. & Abelson, R. A patient by any other name...: clinician group differences in labelling bias. Journal of Consulting and Clinical Psychology, 1974, 42, 4-9.

Langer, E. & Benevento, A. Self-induced dependence. Journal of Personality and Social Psychology, 1978, 36, 886-893.

Langer, E., & Imber, L.G. When practice makes imperfect: debilitating effects of overlearning. Journal of Personality and Social Psychology,

1979, 37, 2014-2024.

Langer, E., & Imber, L.G. Role of mindlessness in the perception of deviance. Journal of Personality and Social Psychology, 1980, 39, 360-367.

Mayer, R.E. Elaboration techniques that increase the meaningfulness of technical text: an experimental test of the learning strategy hypothesis. Journal of Educational Psychology, 1980, 72, 770-784.

Mischel, W. On the interface of cognition and personality. American Psychologist, 1979, 34, 740-754.

Morgan, M. Television viewing and reading: Does more equal better? Journal of Communication, 1980, 30, 159-165.

Morrison, P., Kelly, H., & Gardner, H. Reasoning about realities of television: A developmental study. Journal of Broadcasting, in press.

Nisbett, R., & Ross, L. Human inference: strategies and shortcomings of social judgment. Englewood Cliffs, N.J.: Prentice-Hall, 1980.

Salomon, G. Effects of encouraging Israeli mothers to coobserve "Sesame Street" with their five-year-olds. Child Development, 1977, 48, 1146-1151.

Salomon, G. Communication and education: social and psychological interactions. Beverly Hills, Ca.: Sage, 1981(a).

Salomon, G. Introducing AIME: The assessment of children's involvment with television. In H. Kelly & H. Gardner (eds.) Viewing children through television. New Directions for Child Development. San Francisco, Ca.: Jossey Bass, 1981(b).

Salomon, G., Self fulfilling and self sustaining prophecies and behaviors that realize them: a comment. American Psychologist, 1981, 36, 1452-1453,(c).

Salomon, G. Television watching and mental effort: a social psychological view. In J. Bryant & D. Anderson (eds.), Watching TV, understanding TV.

New York: Academic Press, in press.

Shavelson, R., Caldwell, J., & Izu, T. Teachers' sensitivity to the reliability of information in making pedagogical decisions. American Educational Research Journal, 1977, 14, 83-97.

Shiffrin, R.M. and Schneider, W. Controlled and automatic human information processing:II. Perceptual learning, automatic attention, and a general theory. Psychological Review, 1977, 84, 127-190.

Singer, J.L. The powers and limitations of television. In P.H. Tennenbaum (ed.), The entertainment functions of television. Hillsdalem N.J.: Erlbaum, 1980.

Snow, R.E. Research on aptitudes: a progress report. In L.S. Shulman (ed.) Review of Research in education, Vol. 4. Hasca, Il.: Peacock, 1977.

Steiner, I.D. Three kinds of reported choice. In L.C. Perlmuter & R.C.Monty (eds.), Choice and perceived control. Hillsdale, NJ.: Lawrence Erlbaum, 1979.

Tverski, A., & Kahneman, D. Judgment under uncertainty: heuristics and biases. Science, 1974, 195, 1124-1131.

Weick, K.E. The social psychology of organizing. Reading, Ma.: Addison-Wesley, 1979.